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Resonant Soft X-ray Scattering studies of charge orders in high-temperature cuprates with Transition Edge Sensors¹ YIZHI FANG, Univ of Illinois - Urbana; Argonne National Laboratory, PETER ABBAMONTE, Univ of Illinois - Urbana, FANNY RODOLAKIS, JESSICA MCCHESENEY, Argonne National Laboratory, HIDEYUKI TATSUNO, National Institute of Standards and Technology; Lund University, YOUNG IL JOE, JOE FOWLER, KELSEY MORGAN, WILLIAM DORIESE, DANIEL SWETZ, JOEL ULLOM, National Institute of Standards and Technology — Resonant Soft X-ray studies of high T_c cuprates have implied a complex yet unresolved relationship between charge orders, antiferromagnetism and superconductivity. Unfortunately, at resonance the inelastic fluorescence background makes it hard to distinguish weak charge orders. To eliminate this issue, we have developed an energy-resolving detector comprised of 240-pixels superconducting Transition-Edge Sensor microcalorimeters. These superconducting sensors obtain exquisite resolution by exploiting the superconducting-to-normal transition to transduce photon energy to temperature and by operating at cryogenic temperatures (~ 100 mK) where thermal noise is minimal. Initial commissioning was accomplished at Advanced Photon Source Sector 29 in August 2015 and have demonstrated 1.0 eV resolution below 1 keV with efficiency (solid angle \times quantum efficiency) ~ 50 times than that of grating spectrometers. An experiment to study charge orders in LBCO, LESCO and YBCO as a function of doping will take place in November 2015.

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Yizhi Fang
Univ of Illinois - Urbana; Argonne National Laboratory